3.9 FIRE

3.9.1 Introduction

Fire has been an integral part of the forest environment for thousands of years. The likelihood of a fire initiation and the extent and severity of the resulting fire are affected by the vegetation and other fuel on the site. This section discusses the frequency of fire in the forests of Washington, the common causes of those fires, and the effects on future fires likely to result from each of the alternatives.

3.9.2 Affected Environment

Forest fires have occurred in the area that now makes up the state of Washington for millions of years. The most common natural cause of these fires is lightning. Areas east of the Cascade Crest average 10 to 15 thunderstorms per year while areas west of the Crest average 5 per year. Most of the forested areas of Washington experience between 1 and 6 lightning fires per 100,000 acres each year. However, lightning fires are more common in some areas in Okanogan, Ferry, and Chelan Counties (Agee, 1993). When conditions are dry and fuel is abundant, these lightning fires can burn large areas. One lightning fire in Chelan County, the1994 Tyee Fire, burned over 140,000 acres and cost millions of dollars to suppress.

In the cool, moist climate of western Washington, climatic conditions, fuel accumulation, and lightning ignition combine to result in extensive stand-replacement fires on an average of once every 230 years (though this varies from as often as every 150 years in drier areas to several hundred years in wetter areas). These fires were generally intense; often 50 to 100 years would pass before these burns became fully restocked with native conifers (Franklin et al., 1981). On the eastside, Ponderosa pine forests historically have had extensive fires every 15 years on average, mixed conifer forests an average of every 50 years, and the moister, high elevation forests experience fire only about once every 500 years (Agee, 1993). Often the more frequent fires on the eastside represented understory burns that maintained the canopy, or at least a portion of the canopy.

Lightning fires, which usually start as the result of lightning strikes in large trees or snags, account for approximately 37 percent of the forest fires in Washington. Less than 1 percent are caused by spontaneous combustion or other natural causes (Agee, 1993). The remaining fires are caused by humans, and are due to campfire escapes, industrial activity, other accidents, or are intentionally set.

Fire suppression efforts over the past century have had a substantial effect on existing vegetation in many areas of the state, particularly on the east side. Fuel levels are high in many parts of eastern Washington, because the frequent understory fires that once burned these areas and kept fuel levels in check have been aggressively suppressed. As a result, fires are now often more intense and difficult to suppress.

3.9.3 Environmental Effects

By maintaining standing trees and snags in RMZs, surrounded by dead fuel on the ground as the result of logging operations, all alternatives contribute to the risk of a wildfire occurring. The extent of the risk is likely to be greater in those alternatives that leave more standing trees and snags and more down woody debris. These can act as lightning rods and increase the likelihood of a fire start, as well as enhance its spread after it has started. The risk is likely to be greater in areas where fire is more common due to climatic and topographic factors. In other words, a fire is more likely to begin in a wide riparian buffer in a ponderosa pine forest on a south-facing slope in Chelan County than in a narrow buffer in a western hemlock forest on a north-facing slope in Whatcom County.

Once a fire begins, its rate of spread, and the difficulty that fire fighters will have controlling it, are related to the amount and type of fuel and to weather and topographic conditions. Weather and topographic conditions would not be effected by the proposed alternatives, but fuels would be affected. Alternatives that leave more wood on the ground (large woody debris), especially in conjunction with standing trees and snags, are more likely to support fire spread than alternatives that leave less. Dead limbs and logs on the ground, especially large logs, increase the intensity of the fire. Heavier fuel on the ground means a hotter fire that burns for a longer period of time. This volatilizes nitrogen, a nutrient often deficient in forest soils, and can cause greater soil damage, resulting in increased soil erosion (Biswell, 1989). It can also lead to an increase of herbaceous vegetation and shrubs that compete with tree seedlings (Saveland and Bunting, 1988). Standing snags and large logs on the ground can also increase the fires spread by 'spotting', throwing burning embers large distances. Alternatives that leave more fuel are likely to have a greater risk than alternatives that leave less. Again, the risk is greater in dryer areas than in wetter ones.

Intense or stand replacement fires are considered to have negative effects on riparian functions and aquatic systems because of elimination of shade, potential for increased erosion and sediment inputs, and other factors. Therefore, optimum conditions are considered to be those that will maintain riparian functions while minimizing the potential for intense, stand-replacement fires.

3.9.3.1 Alternative 1

Present conditions would continue. No buffers would be left on Type 4 and 5 streams and relatively few leave trees and snags would be left in buffers on Type 1, 2, and 3 streams. Approximately two large logs would be left per acre. From 25 to 100 or more leave trees would be left on each side per 1,000 linear feet in RMZs between 25 and 100 feet wide. Some leave-trees would likely blow down, increasing the amount of large woody debris.

With Alternative 1, risk of fire initiation and spread would be similar to current conditions. The risk of intense, stand replacement fires would be relatively low.

The risk of a fire occurring, its rate of spread and intensity would not change compared with current conditions. The risk of intensive, stand replacement fires in the managed riparian zones would be relatively low.

3.9.3.2 Alternative 2

With Alternative 2, the risk of fire initiation and spread would be slightly higher than under Alternative 1. The risk of intense, stand replacement fires would be higher than for Alternative 1, but still relatively low.

A no-harvest buffer, ranging from 50 feet to 100 feet on each side of fish-bearing streams would be left on the westside and 30 feet wide on each side of streams on the eastside. These buffers may contain snags as well as live trees. Trees would also be left in the inner and outer zones of the RMZs on fish-bearing streams as well. Alternative 2 also has minimum requirements on the east side for down wood to be left behind in the inner and outer zones after harvest. It has additional requirements for down wood in cases where salvage logging inside the inner or outer zone is permitted, for both the east side and west side. In addition, some trees would likely blow down, especially in the outer portions of the RMZ, adding to the amount of large down wood. The thinning regime that is prescribed for the eastside is designed to mimic pre-settlement conditions (i.e., the period before fire was intensively suppressed) over a 50-year period. However, the amount of down wood being left under this alternative on the eastside is considerably higher than under Alternative 1 and may be well above the levels that existed under pre-settlement conditions.

Compared to Alternative 1, the increased amount of standing and down wood on the eastside would increase the risk of fire initiation and increase the likelihood that any fire that does start will burn hotter and for a longer time. The size of the fire would also likely be greater than under Alternative 1. However, the narrower no-cut buffers and the thinning regime within the inner and outer zones would help maintain eastside stands more like stands under a natural fire regime. On the cooler, moister westside, little increased risk is expected.

3.9.3.3 Alternative 3

With Alternative 3, the risk of fire initiation and spread would be moderately higher than under Alternative 1, and slightly higher than under Alternative 2. The potential for intense, stand-replacement fires would be highest and would increase over time under this alternative.

A no-harvest buffer from 70 to 170 feet wide on both sides of streams would be left on the westside and from 30 to 100 feet on the eastside. These wider buffers would contain more trees and snags than either of the other alternatives and all existing down woody debris would be retained. In addition, some trees are likely to blow down, especially in the outer portions of the buffer, adding to the amount of large woody debris. The increased amount of standing and down wood is likely to increase the likelihood of a fire starting and increase the likelihood that the fire will burn hotter and for a longer time, than under Alternative 1 or under Alternative 2. The size and intensity of the fire are also likely to be greater than under those alternatives, especially compared to Alternative 1. The potential for intense, stand replacement fires would be highest under this alternative and would increase over time because of the lack of thinning or understory burning within the riparian zone, which would reduce fuels.

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